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- 1 1. A polishing pad for polishing a substrate in a
- 2 chemical mechanical polishing apparatus, comprising:
- 3 a first polishing region having a first plurality of
- 4 substantially circular concentric grooves with a first width
- 5 and a first pitch;
- 6 a second polishing region surrounding the first
- 7 polishing region and having a second plurality of
- 8 substantially circular concentric grooves with a second
- 9 width and a second pitch; and
- 10 wherein at least one of the second width and second
- 11 pitch differs from the first width and first pitch.

1 2. The polishing pad of claim 1, further
2 comprising a third polishing region surrounding the second
3 polishing region and having a third plurality of
4 substantially circular concentric grooves with a third width
5 and a third pitch. ▲

3. The polishing pad of claim 2, wherein the third
width and pitch are equal to the first width and pitch,
respectively.

4. The polishing pad of claim 3, wherein the first
pitch is larger than the second pitch.

1 5. The polishing pad of claim 4, wherein the first
2 pitch is about two times larger than the second pitch.

1 6. The polishing pad of claim 3, wherein the first
2 width is less than the second width.

1 7. The polishing pad of claim 6, wherein the
2 second width is about six time greater than the first width.

1 8. The polishing pad of claim 1, wherein each
2 groove of the first and second pluralities of grooves has a
3 depth of at least about 0.02 inches, a width of at least
4 about 0.015 inches, and a pitch of at least about 0.09
5 inches.

1 9. The polishing pad of claim 8, wherein each
2 groove of the first and second pluralities of grooves has a
3 depth between about 0.02 and 0.05 inches.

1 10. The polishing pad of claim 8, wherein each
2 groove of the first and second pluralities of grooves has a
3 width between about 0.015 and 0.04 inches.

1 11. The polishing pad of claim 8, wherein each
2 groove of the first and second pluralities of grooves has a
3 pitch between about 0.09 and 0.24 inches.

1 12. The polishing pad of claim 1, wherein the first
2 plurality of grooves are separated by a first plurality of
3 annular partitions and the second plurality of grooves are
4 separated by a second plurality of annular partitions.

1 13. The polishing pad of claim 12, wherein the
2 first plurality of partitions cover about 75% of the surface
3 area of the first region and the second plurality of
4 partitions cover about 50% of the surface area of the second
5 region.

1 14. The polishing pad of claim 12, wherein the
2 partitions of the first plurality of partitions are wider
3 than the partitions of the second plurality of partitions.

1 15. A polishing pad for polishing a substrate in a
2 chemical mechanical polishing system, comprising:

3 a polishing surface having a first polishing region
4 and a second polishing region surrounding the first
5 polishing region, a spiral groove formed in the polishing
6 surface, the spiral groove having a first pitch in the first
7 polishing region and a second, different pitch in the second
8 polishing region.

1 16. The polishing pad of claim 15, wherein the
2 first pitch is larger than the second pitch.

1 17. The polishing pad of claim 15, wherein the
2 spiral groove has a uniform width.

1 18. The polishing pad of claim 15, further
2 comprising a third polishing region surrounding the second
3 polishing region, and the pitch of the spiral groove in the
4 third polishing region is equal to the first pitch.

1 19. The polishing pad of claim 15 wherein the
2 spiral groove has a depth of at least about 0.02 inches, a
3 width of at least about 0.015 inches, and a pitch of at
4 least about 0.09 inches.

1 20. A polishing pad for polishing a substrate in a
2 chemical mechanical polishing apparatus, comprising:
3 a first polishing region having a first plurality of

4 substantially circular concentric grooves; and
5 a second polishing region surrounding the first
6 polishing region and having a plurality of substantially
7 serpentine grooves.

1 21. The polishing pad of claim 20, wherein the
2 circular grooves have a first pitch, and the serpentine
3 grooves have a second, different pitch.

1 22. The polishing pad of claim 20, wherein the
2 circular grooves have a first width, and the serpentine
3 grooves have a second, different width.

1 23. The polishing pad of claim 20, wherein the
2 serpentine grooves have a pitch between about one and two
3 times their amplitude.

1 24. The polishing pad of claim 20, wherein the
2 serpentine grooves have a pitch between about one-and-one-
3 half and two times their width.

1 25. The polishing pad of claim 20, wherein the
2 serpentine grooves have a width of about 0.125 inches, a
3 pitch of about 0.2 inches, and an amplitude between about
4 0.2 and 0.4 inches.

1 26. The polishing pad of claim 20, further
2 comprising a third polishing region surrounding the second
3 polishing region and having a second plurality of
4 substantially circular concentric grooves.

1 27. A polishing pad for polishing a substrate in a

1 chemical mechanical polishing apparatus, comprising:
2 a first polishing region having a first plurality of
3 substantially circular concentric grooves; and
4 a second polishing region surrounding the first
5 polishing region and having a second plurality of
6 substantially circular concentric grooves, a center of the
7 second plurality of concentric grooves being offset from a
8 center of the first plurality of concentric grooves.

1 28. The polishing pad of claim 27, wherein the
2 center of the first plurality of grooves is offset from the
3 center of the second plurality of grooves by a distance
4 approximately equal to a pitch of the second plurality of
5 grooves.

1 29. The polishing pad of claim 27, wherein the
2 first plurality of grooves has a first pitch, and the second
3 plurality of grooves has a second, different pitch.

1 30. The polishing pad of claim 27, wherein the
2 first plurality of grooves has a first width, and the second
3 plurality of grooves has a second, different width.

1 31. The polishing pad of claim 27, further
2 comprising a third polishing region surrounding the second
3 polishing region and having a third plurality of
4 substantially circular concentric grooves with a third width
5 and a third pitch, the third plurality of concentric grooves
6 being concentric with the first plurality of concentric
7 grooves.

1 32. The polishing pad of claim 27, wherein each

2 groove of the first and second pluralities of grooves has a
3 depth of at least about 0.02 inches, a width of at least
4 about 0.015 inches, and a pitch of at least 0.09 inches.

1 33. A polishing pad for polishing a substrate in a
2 chemical mechanical polishing apparatus, comprising:
3 a first polishing region having a first plurality of
4 substantially circular concentric grooves; and
5 a second polishing region surrounding the first
6 polishing region and having a plurality of groove arc
7 segments, the groove arc segments disposed along concentric
8 circular paths such that each groove arc segment does not
9 radially overlap a groove arc segment on an adjacent path.

1 34. The polishing pad of claim 33, wherein the
2 circular grooves have a first pitch, and the circular paths
3 have a second, different pitch.

1 35. The polishing pad of claim 33, wherein the
2 circular grooves have a first width and the groove arc
3 segments have a second, different width.

1 36. The polishing pad of claim 33, further
2 comprising a third polishing region surrounding the second
3 polishing region and having a second plurality of
4 substantially circular concentric grooves.

1 37. The polishing pad of claim 33, wherein the
2 circular grooves and groove arc segments have a depth of at
3 least about 0.02 inches, a width of at least about 0.015
4 inches, and a pitch of at least 0.09 inches.

1 38. A polishing pad for polishing a substrate in a
2 chemical mechanical polishing apparatus, comprising:
3 a first polishing region having a first plurality of
4 substantially circular concentric grooves; and
5 a second polishing region surrounding the first
6 polishing region and having a spiral groove.

1 39. The polishing pad of claim 38, wherein the
2 circular grooves have a first pitch, and the spiral groove
3 has a second, different pitch.

1 40. The polishing pad of claim 38, wherein the
2 circular grooves have a first width, and the spiral groove
3 has a second, different width.

1 41. The polishing pad of claim 38, further
2 comprising a third polishing region surrounding the second
3 polishing region and having a second plurality of
4 substantially circular concentric grooves.

1 42. The polishing pad of claim 38, wherein the
2 circular grooves and spiral groove have a depth of at least
3 about 0.02 inches, a width of at least about 0.015 inches,
4 and a pitch of at least 0.09 inches.